

WAR DEPARTMENT

TECHNICAL MANUAL

ORDNANCE MAINTENANCE

**BROWNING MACHINE GUN
CALIBER .30, ALL TYPES
U. S. MACHINE GUN, CALIBER .22
AND TRAINER, CALIBER .22**

April 4, 1942



Doc. coll.
gift.
non circ.

U113
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TM 9-1205
1942

*TM 9-1205

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TECHNICAL MANUAL }
No. 9-1205

WAR DEPARTMENT,
WASHINGTON, April 4, 1942.

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BROWNING MACHINE GUN, CALIBER .30, ALL TYPES; U. S. MACHINE GUN, CALIBER .22, AND TRAINER, CALIBER .22

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SECTION I

GENERAL

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1. **Purpose and scope.**—*a. Purpose.*—(1) The purpose of this manual is to furnish instructions for the inspection, maintenance, and repair of the following:

- (a) *Browning machine guns, caliber .30.*
M1917, water-cooled.

*This pamphlet supersedes TM 9-1205, November 15, 1941.

M1917A1, water-cooled.

M1918M1, aircraft, fixed and flexible.

M1919, aircraft, fixed and flexible.

M1919A2, fixed and flexible.

M1919A4, fixed and flexible.

M2, aircraft, fixed and flexible.

M2, heavy barrel, fixed and flexible.

(b) *Machine guns, caliber .22.*

U. S. M1.

Trainer M3.

Trainer M4.

(c) *Tripods and belt-filling machine (used with the above guns).*

(2) The manual is intended for the use of ordnance maintenance companies and such trained ordnance personnel as are charged with inspection, maintenance, and repair of this matériel.

b. *Scope.*—This manual contains instructions for inspection, maintenance, and repair supplementary to information given in other publications (see appendix). The information given is treated as a single set of instructions applicable to all models of this weapon as listed in *a* above. Items which do not apply to the particular model in question will therefore be disregarded.

2. Characteristics of Browning machine gun, caliber .30.—

a. *M1917 and modifications.*—(1) The Browning machine gun, caliber .30, M1917, was designed to function with model 1906 cartridges against normal ground targets. At that time, no requirement existed for using ground machine guns against aerial targets. The tripod mount, caliber .30, M1917, had an elevating stem so mounted that it was free to rotate about both the vertical and horizontal axes. When the tripod mount, caliber .30, M1917A1, was developed, it was necessary to provide for quicker mounting and dismounting of the gun. This required that the elevating stem of the elevating mechanism be retained in a vertical position and keyed to prevent rotation. The principal differences between the Browning machine gun, caliber .30, M1917, when modified to the Browning machine gun, caliber .30, M1917A1, are as follows:

(a) A new bottom plate (D35392) which includes all the pieces of the stirrup in the old bottom plate and the mounting bracket (previously the elevating bracket).

(b) A new belt feed lever and mounting of the type used in the Browning machine gun, caliber .30, M1919A4. This was necessitated by relocating the ammunition chest on the ground instead of on the tripod, resulting in a material increase in the weight to be lifted by the feeding mechanism of the gun.

(c) An improved cover latch assembly using a new type of spring in modifying the latch.

(d) Sights graduated for either M1 ball ammunition or M2 ammunition.

(e) Guns which were modified at a later date were equipped with cover catch assemblies to retain the cover in a fixed position whenever it was opened.

(f) A tension spring in the rear sight assembly for the purpose of damping the vibration of the sight.

(2) The Browning machine gun, caliber .30, M1917A1, of new manufacture will include in addition to the above-mentioned changes the following new features:

(a) A steel end cap in place of the bronze end caps currently used.

(b) A steel trunnion block in place of the currently used bronze trunnion block.

NOTE.—Both the steel trunnion block and the steel end cap will be interchangeable with the present bronze parts.

(c) An approved steam tube assembly of the type used in Browning machine gun, caliber .50, M2, water-cooled.

(d) A new bunter plate of the type used in the Browning machine gun, caliber .30, M1919A4. This bunter plate will be of a cylindrical rather than a flat type to facilitate manufacture and maintenance.

(e) An improved barrel gland assembly in the end cap which will be made of noncorrosive material.

(f) A recoil plate in the bolt which will be similar to those now used in the Browning machine gun, caliber .30, M2, and caliber .50, M2.

(g) A rear sight graduated for M2 ball ammunition.

(h) A cover catch assembly is assembled to all guns.

(3) The Browning machine gun, caliber .30, M1917A1, can be identified immediately by the new bottom plate (D35392) which differs materially from that on the Browning machine gun, caliber .30, M1917.

b. M1919 and modifications.—(1) The Browning machine gun, caliber .30, M1919 pattern, as initially issued, was designated Browning tank machine gun, caliber .30, M1919. Successive modifications have been indicated by the designations Browning machine gun, caliber .30, M1919A2, and Browning machine gun, caliber .30, M1919A4, fixed and flexible.

(2) The Browning tank machine gun, caliber .30, M1919, was primarily intended for use in the 7½ ton tank, M1917, and in the Mk. VIII tank, both of which have been declared obsolete.

(3) The Browning machine gun, caliber .30, M1919A2, is used as a light machine gun for cavalry rifle troops, and may also be mounted in certain combat vehicles. The tripod mount M2 is issued with this gun for ground use. The basic differences between the M1919 and the M1919A2 are as follows:

(a) The flexible back plate assembly is modified by replacing the buffer disks with a helical spring, retaining one disk. The wood stock is replaced with an aluminum stock assembled with a buffer spring and screw.

(b) The tubular rear sight is removed and a different type of rear sight placed on the latch.

(c) The front sight is removed from the trunnion block mounting and a different type of front sight placed on the barrel jacket.

(d) A quantity of these guns have been modified to include a cover catch assembly.

(4) The Browning machine gun, caliber .30, M1919A4, is mainly used as armament for combat vehicles. As originally manufactured it is similar to the M1919A2 with the following exceptions:

(a) The barrel, of new design, is 24 inches in length, an increase from the 18.63-inch length used on all preceding M1919 guns. The barrel is not interchangeable with the preceding M1919 as the bore of the front bearing of all 18.63-inch length barrels is smaller than that of the rear bearing, while the bores of the M1919A4 barrel bearings are equal. A separate front barrel bearing plug is supplied for M1 and M2 ammunition.

(b) The barrel jacket is a new design, 19.08 inches in length, increased from 13.7 inches.

(c) The belt feed lever group assembly is added to provide for the assembly and disassembly of the belt feed lever from the top of the cover. The belt feed lever pivot bushing forms the bearing for the belt feed lever pivot and is locked to the cover by the bushing nut. A cotter pin is provided to retain the pivot in the assembled position.

(d) The rear sight is mounted on the cover latch and is equipped with a regruated leaf for the new sight radius of 14 inches, a new rear sight slide, mil scale, and windage scale. The sight is hinged so as to fold for convenience in packing.

(e) The front sight is rigid and assembled to the trunnion block of the gun.

(f) A quantity of these guns have been modified to include a cover catch assembly.

(5) The M1919A4 gun of current manufacture has been modified from the gun of older manufacture, but the designation remains unchanged. Details of the modification are as follows:

(a) The flexible back plate assembly has been modified by replacing the tapered buffer plug, buffer ring, and buffer filler with an assembly consisting of a buffer plug, buffer ring, and buffer disks. This construction eliminates "freezing" of the ring and plug, which retards the action of the buffer spring.

(b) The bottom plate is a new design which eliminates the separate stirrup, elevating bracket, and bottom plate of the previous models by having these components integral with the present bottom plate. This bottom plate is riveted to the receiver and provided with a recess to locate the machine gun in the pack hanger.

(c) The belt feed lever pivot is held in place by the use of a new nut assembly consisting of a belt feed lever pivot nut, screw, and lock washer. The old belt feed lever pivot pin and belt feed lever bushing are also used for the group assembly.

(d) The latch handle is riveted to the latch to facilitate release of the cover latch. This handle replaces the latch knob used on previous models.

(e) The rear sight base is mounted on a bracket fastened to the left side plate of the receiver. The graduations for range are increased.

(f) The front sight is hinged to permit folding for convenience in packing the gun.

(g) The trunnion block is equipped with a bunter plug to resist wear at that point.

(h) All of these guns are equipped with cover catch assemblies.

(i) The barrel and barrel jacket assemblies are interchangeable on all M1919A4 machine guns.

SECTION II

INSPECTION

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3. General.—*a.* Inspection is made for the purpose of determining the condition of the matériel, whether repairs or adjustments are required, and the remedies necessary to insure that the matériel is in serviceable condition. Before inspection is begun the gun should be properly cleaned to remove any grease, dirt, or other foreign matter which might interfere with the proper functioning of the weapon.

For instructions on cleaning and assembling and disassembling of these guns, see FM 23-45, 23-50, and 23-55 or TM 9-850.

b. The procedure to be followed relating to inspection and maintenance will be covered in TM 9-1100.

4. Tools.—*a.* The tools for inspection and maintenance and repair, including general and special tools, are listed in SNL A-35 and are to be taken from stock carried on the small arms repair truck. The combination tool is issued as part of the standard equipment for these guns.

b. The following describes the use of the special tools for inspection:

(1) *Gage, breech bore (C3940).*—The bore gage is used to measure wear and determine the serviceability of the barrel.

(2) *Gage, firing pin hole, 0.081 inch (A77203).*—The firing pin hole gage is used to determine the serviceability of the bolt.

(3) *Gage, head space, 1.940 inches (C7719A), 1.946 inches (C7719G), 1.950 inches (C7719M).*—Head space gages are used to determine proper head space adjustment and depth of chamber.

(4) *Reflector, barrel.*—The barrel reflector is used for the visual inspection of the bore.

(5) *Tool, combination.*—For description and use of the combination tool see paragraph 8*b*(1).

5. Gun.—The inspection of the gun consists of the following points to be inspected, arranged in order of inspection. (See fig. 17 for inspection points.)

a. Gun as unit (A).—Observe general appearance and smoothness of operation; test functioning with dummy cartridges. Check head space adjustment. For information on head space adjustment see FM 23-45, 23-50, and 23-55, and *s* below. Work the bolt by hand two or three times to see that the breech lock operates smoothly. Raise the cover and the extractor. Move the bolt slightly to the rear by means of the bolt handle. If the bolt moves independently of the barrel the adjustment needs tightening. There must be no rearward movement of the bolt independent of the barrel prior to the unlocking of the breech.

b. Water jacket (B).—Inspect for leaks at the end cap and trunnion block. Check relative position of alinement marks. Look for broken or burred threads on water plugs and condition of cork assembly.

c. Rear sight (C).—Test for excessive friction in windage screw; tension of windage screw spring; play in rear sight movable base; functioning of aperture disk, half nut, and elevating screw; and

loose movable base pivot. Test the operation of the mil click device on the elevating and windage screws.

d. Front sight (D).—Check alinement and look for burs and other deformities of sight. On the folding type front sight of the air-cooled ground gun, test for play in post on bearing screw and operation of plunger locking device.

e. Rear cover (group) (E).—Inspect rear cover extractor cam for worn or burred surfaces. Test rear sight fixed base for firmness, weak cover extractor cam spring, worn or burred belt feed pawl or belt feed slide, tension of the belt feed pawl spring, worn or loose belt feed lever pivot or worn hole in belt feed lever, and weak belt feed lever pivot spring.

f. Rear cover pin (F).—Inspect for burs and broken or weak spring. Test cover catch assembly for worn or burred surfaces.

NOTE.—The cover catch assembly used on conventional guns is located on the right side of the cover. When used on a tank gun mounted in combination with a 37-mm gun, it is called a cover detent and assembled on the left side of the cover.

g. Back plate group (G).—Inspect for split stock, weak trigger lock, burs on adjusting screw and back plate, missing parts of buffer group and cover latch stop screw. The back plate should fit tightly but should not bind. The adjusting screw should be turned in tightly in all cases.

NOTE.—Care should be exercised in inspection and assembly of the caliber .30, M1919A4 gun, fixed and flexible, to see that there is a $\frac{3}{32}$ -inch dimension maintained between stop (A173245) and buffer (A20482) and the fixed back plate assembly (C64269), and between stop (A130473) and filler (A160497) on the flexible back plate assembly (C64010). This precaution must be taken to insure that $\frac{1}{32}$ inch of plate (A20581) will always project from the back plate to take the shock of the bolt in recoil.

h. Rear cover latch (H).—Inspect for burs or worn surfaces. If latch does not hold cover down tightly the latch should be replaced. Observe tension of cover latch spring.

i. Bolt (I).—Inspect for burred or worn surfaces and enlarged firing pin hole. Face of bolt must not be set back. When testing the firing pin hole use the 0.081-inch plug gage (A77203) for the caliber .30 guns. If the gage enters the hole, the bolt, if otherwise serviceable, should be sent to Springfield Armory for reworking. Broken or otherwise unserviceable bolt assemblies may be disposed of locally. To determine if the face of the bolt is set back, place a micrometer depth gage across the top of the lips and adjust gage until it contacts the face of the bolt. This dimension should not exceed 0.126 inch.

j. Firing pin (J).—Check the firing pin for free movement in the bolt. Note the condition of the sear notch. The point should be kept smooth. The sear notch should be smooth and in good condition with its forward edge sharp. Care should be taken to see that a wire edge is not set up at this point. If either the point or the sear notch becomes damaged, the firing pin should be replaced. If it is suspected that the firing pin spring is weak, as evidenced by a light blow on the primer, the spring should be removed and compared with a new one in free length as follows:

4 $\frac{1}{4}$ inches, caliber .30, M1917A1, watercooled.

4 $\frac{7}{8}$ inches, caliber .30, M1919, aircraft, fixed and flexible (replace if less than 4 $\frac{5}{8}$ inches).

4 $\frac{1}{4}$ inches, caliber .30, M1919A4, fixed and flexible.

4 $\frac{7}{8}$ inches, caliber .30, M1918M1, aircraft, fixed and flexible (replace if less than 4 $\frac{5}{8}$ inches).

5 $\frac{3}{8}$ inches, caliber .30, M2, aircraft, fixed and flexible.

5 $\frac{3}{8}$ inches, caliber .30, M2, heavy barrel, fixed and flexible.

4 $\frac{1}{4}$ inches, caliber .22, trainer, M3 and M4.

3 $\frac{7}{16}$ inches, caliber .22, U. S., M1.

If the spring is damaged or short in free length it must be replaced by a new one.

k. Sear and sear slide (group) (K).—Inspect sear for worn notch, sear spring for tension, and sear slide for fit. The end of the sear slide should be about flush with the outside of the bolt when the gun is cocked, and should require only a very little lateral movement before it comes in contact with the sear. When there is too much lateral play in the sear slide this play may be removed as explained in paragraph 10*h*.

l. Cocking lever (L).—Inspect for burred or worn nose. When the bolt is assembled in the gun and the firing pin is forward, the cocking lever should have a little play in the cam slot in the top plate.

m. Extractor (M).—Inspect for weak extractor cam plunger spring, broken or worn ejector, loose extractor cam plunger pin, or ejector pin. Look for burs on ejector and extractor cam plunger.

n. Driving spring (N).—Check free length with dimensions given below:

17 inches (0.047-inch diameter wire), caliber .30, M1917A1, water-cooled.

16 $\frac{3}{8}$ inches (0.041-inch diameter wire), caliber .30, M1917A1, water-cooled.

17 inches, caliber .30, M1919, aircraft, fixed and flexible.

17 inches (0.047-inch diameter wire), caliber .30, M1919A4, fixed and flexible.

16 $\frac{3}{8}$ inches (0.041-inch diameter wire), caliber .30, M1919A4, fixed and flexible.

17 inches, caliber .30, M1918MI, aircraft, fixed and flexible.

12 $\frac{3}{8}$ inches, caliber .30, M2, aircraft, fixed and flexible.

12 $\frac{3}{8}$ inches, caliber .30, M2, heavy barrel, fixed and flexible.

10 $\frac{1}{2}$ inches, caliber .22, trainer, M3 and M4.

16 $\frac{3}{8}$ inches, caliber .22, U. S., M1.

If length of spring differs by more than 1 inch it should be replaced. Inspect driving spring rod pin for fit, and driving spring rod for burs in slot.

o. Lock frame (group) (O).—Inspect breech lock pin cams for burs and rough surfaces, accelerator for burs, breech lock pin cams for smoothness, and cams on trigger for wear or broken parts. Where gun is to be fired synchronized the trigger should always be removed. Test functions of barrel plunger and note free length of barrel plunger spring as follows:

4 4 inches, caliber .30, M1917A1, water-cooled.

4.4 inches, caliber .30, M1919, aircraft, fixed and flexible.

3.9 inches, caliber .30, M1919A4, fixed and flexible.

4.4 inches, caliber .30, M1918MI, aircraft, fixed and flexible.

3 $\frac{9}{16}$ inches, caliber .30, M2, aircraft, fixed and flexible.

3 $\frac{9}{16}$ inches, caliber .30, M2, heavy barrel, fixed and flexible.

4.4 inches, caliber .22, trainer, M3.

3.9 inches, caliber .22, trainer, M4.

4.4 inches, caliber .22, U. S., M1.

If length of spring differs by more than $\frac{1}{4}$ inch it should be replaced. Check for broken or missing accelerator pin spring and for broken or burred barrel plunger guide.

p. Barrel extension (group) (P).—Check for burred or worn surfaces, broken or missing breech lock pin spring, worn threads, and weak or broken barrel locking spring. The barrel threads should make an easy fit but not a loose fit. Test for undue looseness of breech lock in its recess and for cracks or flaws in that portion of the barrel extension which supports the breech lock. In operation the extractor in dropping to its lowest position sometimes causes a bur on the top of the left side of the barrel extension and a similar bur is occasionally caused by the ejector on the right side. These burs should be carefully removed.

q. Receiver (group) (Q).—Check for weak belt holding pawl spring, burred or worn belt holding pawl, burred or broken extractor cam or extractor feed cam. Look for burred breech lock cam (breech lock

cam should be slightly loose), loose or broken breech lock cam screw (breech lock cam screw should be center-punched in place), loose side, bottom, and top plate rivets, broken bottom plate, cracked or bent side plates at back plate grooves, loose operating slide guides, missing stops on operating slide, and missing or bent belt link guide. The rear cartridge stop should have a slight amount of play.

r. Barrel (R).—Inspection of barrels for serviceability will in general be based on accuracy, and inspectors will be guided by this requirement. Accuracy is reduced in varying degrees by bulges, erosion, and pits. The extent to which these defects reduce accuracy is determined in machine-gun barrels by two methods: visual inspection and bore gaging. Before any attempt is made to inspect a barrel for serviceability all metal and powder fouling should be removed and the bore wiped dry.

(1) *Visual inspection.*—Hold the barrel up to the light (sky) and examine the bore from the muzzle and breech. If the bore appears free from bulges and pits, and the lands are sharp and uniformly distinct, the barrel is serviceable. Note the breech end of the bore. If lands are worn away so that the first 6 or 8 inches of the bore are smooth the barrel is unserviceable and should be scrapped. If the barrel contains small pits but has sharp and uniformly distinct lands and is free from bulges, it will be sufficiently accurate to be serviceable. If the barrel contains a bulge, it is unserviceable and should be scrapped. This condition is indicated by a shadowy depression or dark ring in the bore and may often be noticed through a bulge or raised ring on the barrel surface. If the barrel is pitted to the extent that the sharpness of the lands is affected, or if it has a pit or pits in the lands or grooves large enough to permit the passage of gas past the bullet, that is, a pit the width of a land or groove and $\frac{3}{8}$ inch or longer, it is or soon will be too inaccurate for serviceability and should be scrapped.

(2) *Bore gaging.*—Each barrel inspected and found serviceable by visual test will be bore gaged, using the breech bore gage as shown on drawing C3940. Insert the breech bore gage into the breech end of the barrel and if the gage reads 0.310 inch or more, the barrel is unserviceable and should be scrapped. See that the length of the chamber of the barrel is not excessive; if it is, it will be necessary to replace the barrel. To determine whether or not the length of the chamber is excessive, place the 1.946-inch head space gage in the chamber and with a depth gage find the dimension from the face of the head space gage to the lip of the barrel. If the gage protrudes less than 0.117 inch, the barrel should be scrapped. Particular attention should be paid to the notches, as broken-down notches will

allow the barrel to turn and will cause a change in the head space adjustment. This breaking down of the notches is caused by adjusting head space with the barrel assembled in the gun.

s. Gage test of head space adjustment.—As a means of verifying head space adjustment made by the method prescribed in FM 23-45, 23-50, and 23-55, and for determining if the bolt face is set back or the chamber is oversize, or both, the following gage test is prescribed, using head space gages (1.946 inches maximum and 1.94 inches minimum) carried on the small arms repair truck; and the micrometer depth gage carried on the artillery repair truck.

(1) To verify the head space adjustment remove the barrel plunger and barrel plunger spring from lock frame. Assemble the mechanism. Leave driving spring locked. Work the mechanism several times to see that it does not bind. With cover raised, place the maximum (1.946 inches) gage in feedway, hold down on extractor, and pull the bolt to the rear until the gage drops in line with the chamber. Push the bolt forward. If the adjustment is correct the mechanism will bind slightly. If it does not bind slightly, withdraw the mechanism, and mark the position of the barrel with relation to the barrel locking spring. Take up the barrel one notch (0.004 inch), and repeat the gage test. Continue this operation until the bolt binds slightly. Insert the minimum (1.94 inches) gage and work mechanism back and forth. The movement should be free. Under these conditions the head space is the same as shown on the maximum gage. To determine the error that existed, count the notches taken up and multiply by four, which gives the error in thousandths (example, one notch by 4=0.004 inch). If the slight binding effect necessary for correct adjustment is not attained by the method specified, or if the gun continues to rupture cartridges, either the chamber is oversize or the bolt face is set back, or both.

(2) The chamber may become enlarged through wear or corrosion. This will allow the cartridge or maximum (1.946 inches) gage to go too far forward, and will give excessive head space which cannot be adjusted, nor will the slight binding prescribed in the test be evident. To determine if the chamber is oversize, remove the barrel and insert the maximum (1.946 inches) gage in chamber. This gage should protrude 0.125 inch ($\frac{1}{8}$ inch). If it protrudes less than 0.117 inch, the barrel should be scrapped.

NOTE.—Unserviceable machine gun barrel assemblies which have a sleeve assembled to the muzzle end may be disposed of locally after the sleeves are removed. These sleeves should be forwarded to Springfield Armory for reassembly to new barrels.

6. Tripods.—*a. M1917A1 as unit.*—Note general appearance, smoothness of operation of elevating and traversing mechanism, and rigidity.

(1) *Elevating mechanism (group).*—Check threads on elevating screw for worn or burred surfaces. Check for missing split pins, worn tumbler pinholes in tumbler, worn elevating handwheel dial click or weak click spring, small or worn tumbler pin split pin. Inspect for worn joint pinhole in elevating screw or worn elevating mechanism joint pin, and broken elevating screw joint pin stop.

(2) *Front leg jamming handle.*—Inspect for burred or worn threads and bent handles.

(3) *Cradle, assembly.*—Inspect for loose rivets and separators, worn side plate reinforcements or trunnion joint pin.

(4) *Leg.*—Test for loose head, shoes, and inspect for bent legs and burred or worn serrations. Sharp serrations on legs and socket assure rigidity when the legs are clamped tightly.

(5) *Tumbler pin.*—Test for worn or enlarged split pinholes.

(6) *Cradle clamping bolt.*—Observe function.

(7) *Rear leg joint pin (group).*—Observe function.

(8) *Cradle, socket.*—Inspect for loose locking plates, burred or worn serrations.

b. Caliber .30, M2.—Note general appearance, smoothness of operation and functioning of elevating mechanism, and rigidity of unit. Note any broken, burred, bent, or missing parts.

c. M1918 as unit.—Note general appearance, smoothness of operation of elevating and traversing mechanism, and rigidity.

(1) *Cradle.*—Check for loose ammunition box support; loose or worn trunnion joint pin bearings, and worn elevating joint pin.

(2) *Leg, link, assembly.*—Test for worn teeth and burred threads.

(3) *Elevating mechanism.*—Test for worn click mechanism, weak click spring, loose elevating handwheel cover screw, weak elevating index friction plunger spring, worn elevating index plunger, and worn elevating screw and elevating screw nuts. Check for worn elevating joint pin bearing, loose or broken elevating mechanism joint pin retaining screw.

(4) *Clamping nut (group).*—Test for worn threads and bent handle.

(5) *Traversing worm (group).*—Check for broken handwheel, worn traversing click or traversing click disk, weak traversing click spring, and burred or worn threads on traversing worm carrier.

7. Belt-filling machine.—*a. Machine as unit* (fig. 15).—Note general appearance, smoothness of operation, alinement of needles. The principal difficulty found with this machine is in the needle. If

the needles are kept properly alined, little trouble will be experienced.

b. Crank.—Check for worn cam or crank handle pawl, weak crank handle pawl spring, and burred slot in cam shaft.

c. Frame, assembly.—Check for burs, broken or missing pins, and alinement of frame cap.

d. Needle bar lever (group).—Check for burs, straightness, or missing needle bar spring dowel pin.

e. Lower feed wheel lock lever spring.—Test tension of spring.

f. Tension spring.—Test tension spring.

g. Wheels, feed.—Check for worn or burred surfaces.

h. Feed lever.—Check for worn or burred surfaces.

i. Cartridge guide.—Check for worn or burred surfaces.

SECTION III

MAINTENANCE AND REPAIR

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8. Tools.—*a.* The general tools and special tools referred to in paragraph 4 are required in the maintenance and repair of these machine guns and are part of the equipment of an ordnance maintenance company.

b. Special tools furnished for the repair of these machine guns and their accessories are as follows:

(1) *Tool, combination (special box wrench, screw driver, and punch).*—The combination tool is issued as part of the standard equipment for these guns and is also carried on the small-arms repair truck. The box end is used to remove the muzzle gland and has a large screw driver blade for removing and adjusting the adjusting screw. The small screw driver end is used on the breech lock cam screw, and to turn the driving spring rod to lock or unlock it in its recesses in the bolt. The punch is of two sizes. The larger end is used to force in the trigger pin when removing the lock frame while dismounting the gun. The smaller end is used to force out the ejector pin and extractor cam plunger pin.

(2) *Wrench, water jacket disassembling.*—The water jacket disassembling wrench (fig. 16) is used to apply leverage in unscrewing and screwing up the water jacket, when it is necessary to solder guns that leak at the trunnion block or end cap as directed by paragraph

10b. The plugs, together with the wrench, can be made with the tools on the artillery repair truck which is part of the equipment of an ordnance maintenance company.

9. Instructions.—*a.* The maintenance and repair of these guns is primarily a replacement of worn or broken parts and such replacements are not covered in this Technical Manual. For full detailed instructions in assembling, disassembling, and changing parts see FM 23-45, 23-50, and 23-55.

b. Where parts, assemblies, or parts of assemblies are broken or worn so as to render them unserviceable they must be replaced from stock. Often only parts of the assembly will be worn or broken; where it will take more time to remove the serviceable parts from the assembly than the parts are worth, the assembly should be scrapped.

10. Gun.—*a. Cams and smooth surfaces.*—Where there are burs on cams and smooth surfaces they must be removed. In removing burs a very fine file is used. Be careful not to remove more metal than is necessary. On rough surfaces on moving parts it is advisable to use an oilstone.

b. Water jacket.—When leaks are found in the water jacket, the gun should be stripped of all component parts, steam tube included. With a small cold chisel make an alinement mark on the top of the trunnion block or end cap, as the case may be. Screw the two plugs (fig. 16) into the two holes in the end cap. For instructions in making these two plugs refer to paragraph 8b(2). Now clamp the gun by trunnion block in a vise, using copper vise jaws. Heat the joint to be soldered by playing the flame of two torches on the joint. The parts are hot enough to unscrew when little beads of solder begin to appear around the seam where the water jacket meets the trunnion block. At the proper temperature little force is needed to unscrew the water jacket. Next place the water jacket disassembling tool (fig. 16) over the two plugs in the end cap and apply leverage in a counterclockwise direction and unscrew the water jacket. Clean the water jacket and trunnion block or end cap of all solder residue. Special care must be taken in cleaning these parts, as solder will not adhere to rusty or corroded metal, and the success of this work depends largely on getting these parts clean. In doing this work it is advisable to use a wire brush. When the threads are clean screw on the water jacket by hand to find out how far the alinement mark on the water jacket screws past the corresponding alinement mark on the trunnion block. In order to have a tight joint it is necessary to have about $\frac{1}{2}$ inch of dead draw. This draw is

accomplished as follows: Unscrew the water jacket and peen the outside shoulder of the trunnion block or end cap. In doing this work care must be taken not to peen this shoulder too much. It is best to peen lightly all the way around the shoulder and then try the jacket. Repeat this until the desired draw is acquired. Any high spots caused by peening should be removed with a fine file having a safe edge. Tin the threads on the water jacket and trunnion block, or end cap, keeping the parts warm enough to make the solder flow smoothly. When the threads of both are well coated with solder clamp the gun by the trunnion block in the vise. Heat the trunnion block just enough so that the solder will melt but not run. Before the trunnion block cools heat the water jacket enough to soften the solder and start to screw it on. Keep the flame from both torches playing on the water jacket. Screw up to alinement mark. It may be necessary to strike the wrench with a hammer to screw up the water jacket so that the alinement marks meet. When leaks are due to porous metal or small seams, clean the surface or open the seam slightly with a fine file, and solder carefully with hard solder.

c. Rear sight movable base pivot.—When looseness is found in the rear sight movable base pivot, remove the pivot and disassemble the cover. With a $\frac{1}{4}$ -inch drill, drill a hole through the cover using the pivot hole in the rear sight fixed base as a guide. Then turn the cover on its back and with a $\frac{1}{2}$ -inch drill enlarge the hole just drilled to approximately $\frac{1}{2}$ inch. The purpose of enlarging the hole in the cover is to allow room to insert a center punch which is used to bur over the pivot. Place a lead or brass block on a solid base and with the pivot resting in its seat in the rear sight fixed base set the pivot on the block, and with a center punch stake the edge of the pivot until it is fixed.

d. Front sight blade.—When the front sight blade is out of alinement, place the gun on 1,000-inch range, having a target marked off with a vertical line 1 inch wide and 20 inches long. With the sight set at 700 yards and windage at zero, aline gun on the center of the target and fire a burst of 10 rounds. If shots go to the right of the line, loosen the front sight blade screw and tap the front sight blade slightly to the right; if shots go to the left of the line, the front sight blade should be tapped to the left. Then tighten the screw, relay, reload, and fire. Repeat this operation until proper alinement is obtained.

e. Extractor feed cam.—When the extractor feed cam is found broken, drill out the extractor feed cam rivets, exercising care to center the drill on the rivets. Rivet the new extractor feed cam in place and file the rivets flush.

f. Side plate.—When the side plate at the back plate grooves is broken or cracked, it should be straightened, using the old back plate as a guide. After straightening, the break or crack should be acetylene welded and worn or missing parts should be replaced.

g. Rear sight base.—When the rear sight fixed base is found loose it should be removed by drilling out the rear sight fixed base rivets, using a $\frac{3}{16}$ -inch drill, exercising care to center the drill on the rivets. Replace the base, using new rivets.

h. Sear and sear slide (groups).—If there is excessive play between the sear and sear slide and it cannot be corrected by the interchanging of sear and sear slide it can be corrected by grinding off that portion of the sear that rests on the firing pin. In performing this operation great care should be taken to keep this surface level. It is best to grind off a little at a time and then try the sear and sear slide in the bolt. Be sure the sear slide does not bind on the sear. After proper fit has been obtained, the parts should be smoothed off with a fine oilstone to remove any burs that may have been made by grinding. Care should be taken to see that the outer edge of the sear slide is flush with the bolt and that this edge of the sear slide is square and sharp in order to work properly with the trigger motor slide.

11. Tripods.—*a. M1917A1.*—(1) *Cams and smooth surfaces.*—Burs or rough surfaces on cams and moving parts must be removed. In removing burs use a very fine file. Be careful to remove only the required amount of metal. On rough surfaces it is advisable to use an oilstone.

(2) *Head or shoe of leg assembly.*—When looseness is found in the head or shoe of the leg assembly, the pins should be removed and replaced with new ones. If this does not give the required results, drill new holes through the tube and head or shoe, as the case may be, using a $\frac{3}{16}$ -inch drill.

(3) *Elevating mechanism at trunnion pins.*—When play is found in the elevating mechanism at the trunnion pins, washers should be placed between the head of the tumbler pin and the side of cradle. Washers may be made from tin stock or small-arms ammunition container and should be 1 inch in diameter with a $\frac{5}{8}$ -inch hole. Use "C" clamps or a vise to hold tumbler pins in place while putting in split pins.

(4) *Paint.*—When paint has been scraped off and rust has set in, the parts should be repainted. Tripods that require shop repair should be repainted when practicable in order to add to their life and appearance.

b. M2 and M1918.—The same attention should be given these tripods as described in *a* above.

12. Belt-filling machine.—*a. Description.*—The Browning belt-filling machine is designed for the rapid loading of belts. A wooden box is provided in which to pack the machine when not in use. Care should be taken that the machine is properly packed in the box and secured with the block to prevent damage in transportation.

b. Adjustment.—(1) See that the bearing surfaces and moving parts are well oiled.

(2) See that the needles are properly set, with each upper needle directly above the corresponding lower needle and the points of each upper needle even horizontally.

(3) See that the points of the upper needles are about $\frac{1}{100}$ inch vertically above the points of the lower needles. A playing card makes a convenient gage for regulating the distance between the upper and lower needles. In filling belts the needles sometimes fail to pick up the belt and open the loops. The remedy will usually be found to be the setting of the upper and lower needles farther apart.

(4) See that all screws on the machine are tight, particularly the slide connection screw.

c. Malfunction.—(1) Should a miss occur in loading, stop and remove the belt, turn crank to position, a cartridge over the lower needle bar as in starting, replace the belt with last cartridge in the top groove of the lower feed wheel, close the machine, and proceed. Misses are usually caused by a dull, broken, or improperly adjusted needle, or loose screw on some part of the machine. In some cases the machine will start to load properly, but the belt will slip to the right between the feed wheels, giving uneven loading with successive cartridges, until finally the belt is too far to the right for the needles to pick it up and open a loop. This usually occurs with machines which have a single notch in the tension spring. To remedy, place a splinter, cartridge clip, or other object between the hook and the end of the spring to increase tension. To remedy permanently, loosen or remove the tension spring screw and place a splinter or small roll of paper under the spring outside the screw in such a way that when the screw is tightened the outer end of the spring will be raised and increase the tension when it is engaged under the hook.

(2) Should a jam occur in loading, do not turn the crank, as this will only make the jam worse. Block the cartridges in the guide, remove the belt and the jammed cartridge, and proceed as in (1) above.

- d. Stripping and assembling.*—(1) *To strip.*—Remove—
- (a) Cartridge guide.
 - (b) Magazine by unscrewing magazine screws.
 - (c) Frame cap by unscrewing frame cap screws.
 - (d) Needle bar lever spring by unscrewing it from needle bar lever.
 - (e) Needle bar lever from needle bar lever pin.
 - (f) Needle bar slide and separate needle bars and needle bar slide by removing needle bar screws.
 - (g) Carrier spring.
 - (h) Slide and separate slide connection and slide.
 - (i) Other parts in a similar manner by raising them from their pins or by first removing their respective retaining screws. Do not remove belt guide screws.
- (2) *To assemble.*—Assemble the machine in the reverse order in which it was stripped.
- e. Maintenance.*—(1) *Moving parts.*—Burs or rough surfaces on cams and moving parts must be removed. In removing burs a very fine file is used. Be careful to remove only the amount of metal necessary. On rough surfaces it is advisable to use an oilstone.
- (2) *Cartridge feed.*—When a particular machine consistently feeds the cartridge too far through the belt, it can be corrected by grinding the excess feed distance, usually about $\frac{1}{16}$ inch from the slide to shorten the stroke.
- (3) *Belt opening.*—When belt fails to open, the needle should be replaced. Be very careful in replacing. The points of the needles should be $\frac{1}{100}$ inch part. Note that the needles do not move when the needle screw is tightened.

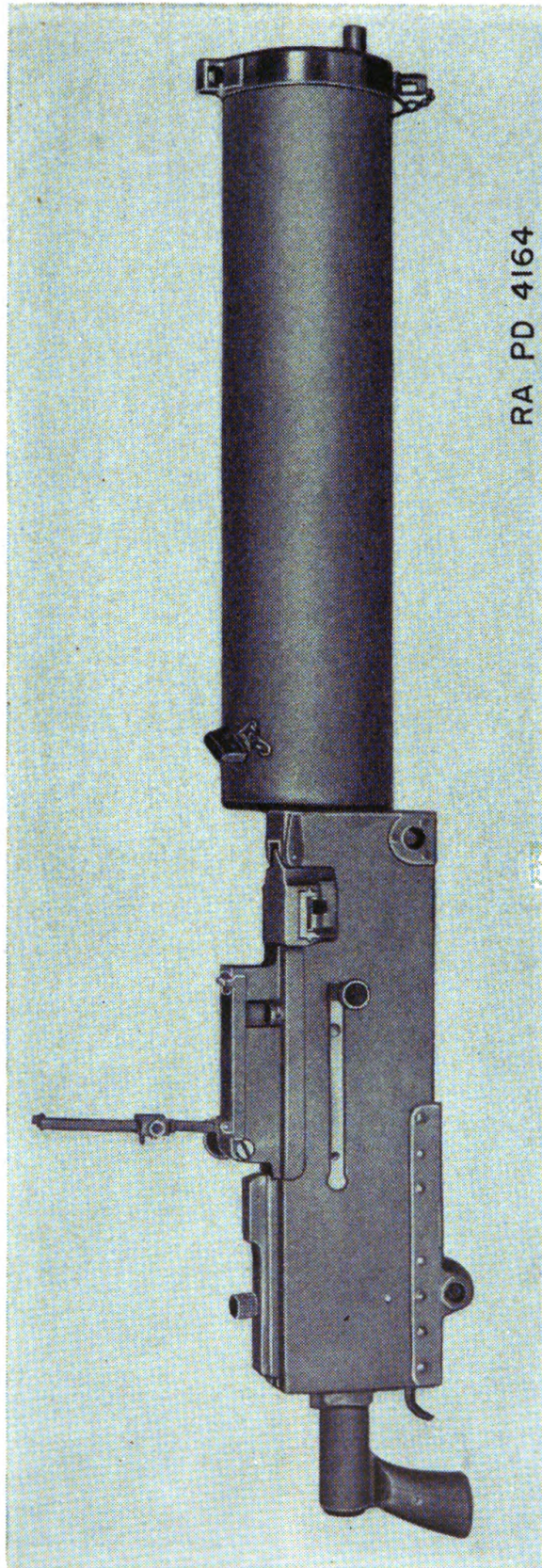


FIGURE 1.—Browning machine gun, caliber .30, M1917A1—right side view.

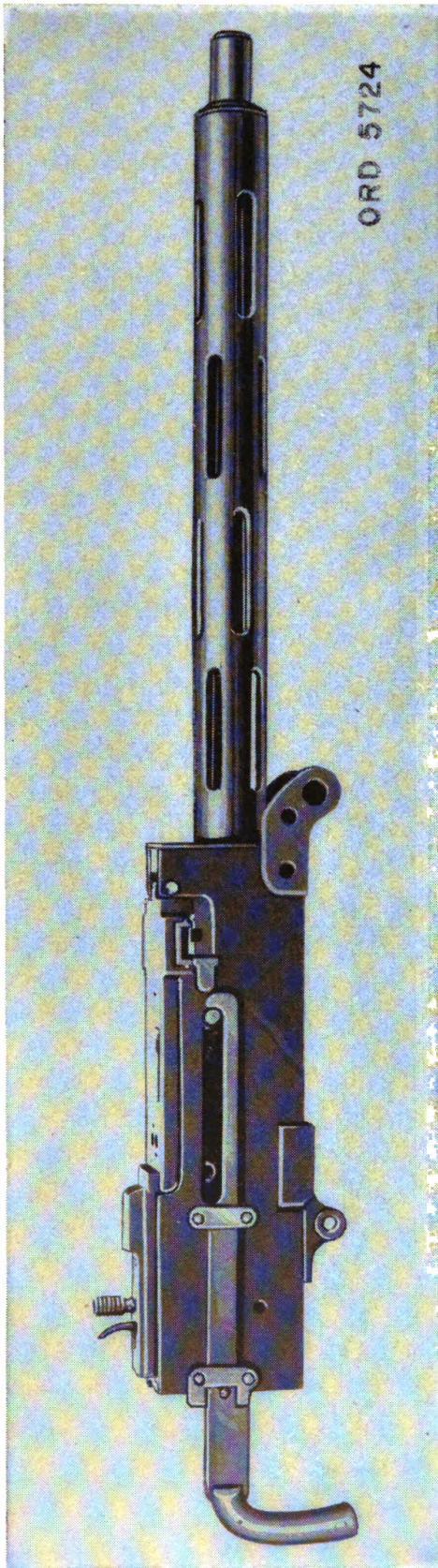


FIGURE 2.—Browning aircraft machine gun, caliber .30, M1918MI—fixed—right side view.

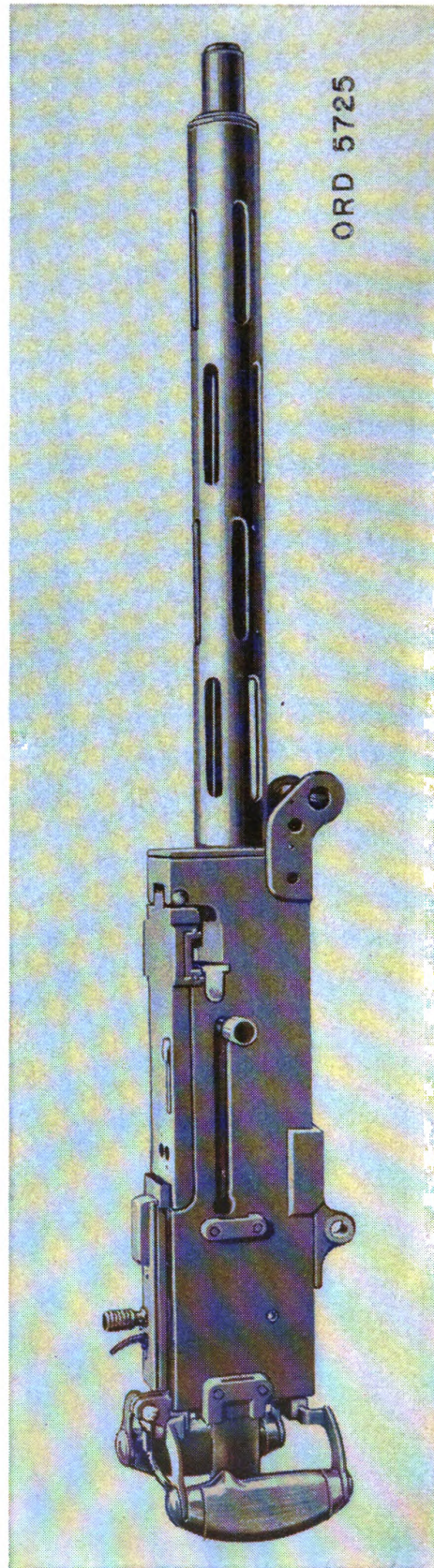


FIGURE 3.—Browning aircraft machine gun, caliber .30, M1918MI—flexible—right side view.

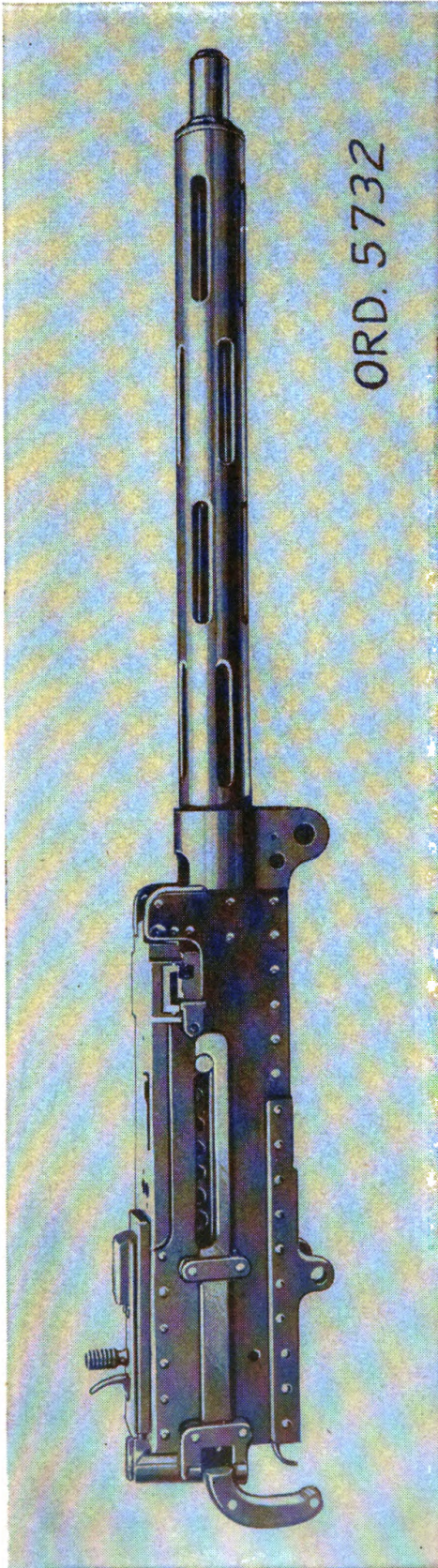


FIGURE 4.—Browning aircraft machine gun, caliber .30, M1919—fixed—right side view.

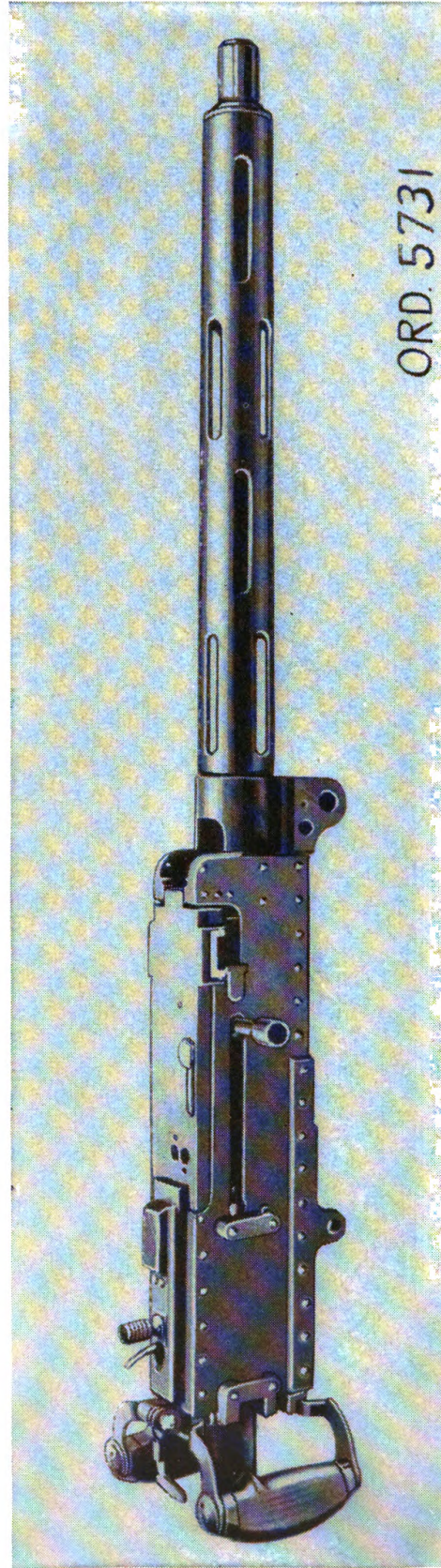


FIGURE 5.—Browning aircraft machine gun, caliber .30, M1919—flexible—right side view.

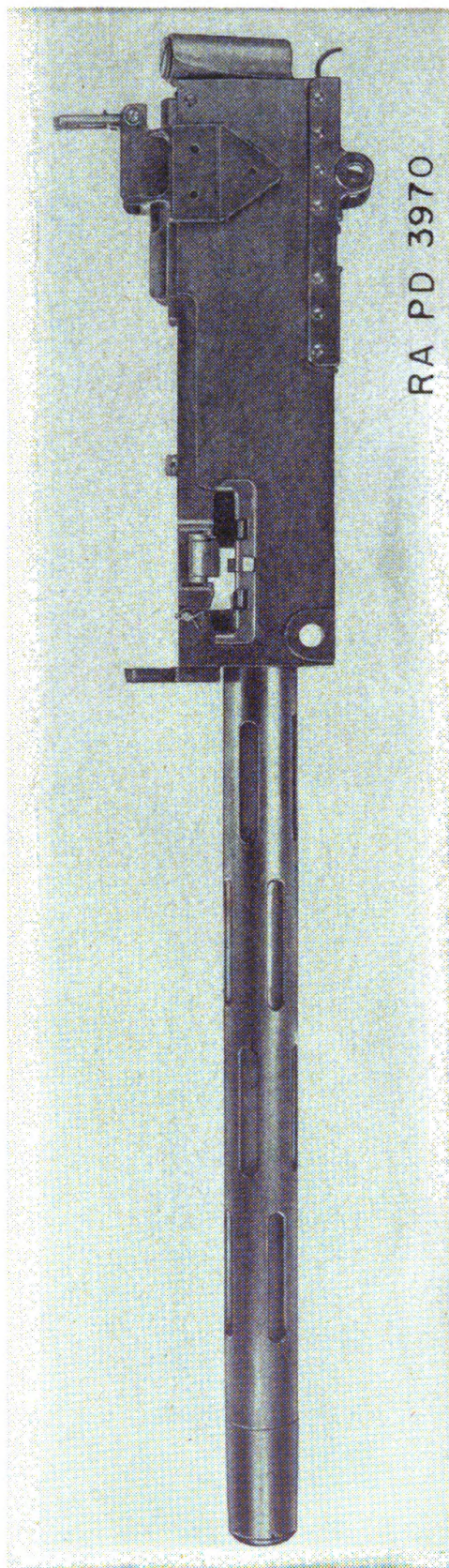


FIGURE 6.—Browning machine gun, caliber .30, M1919A4—fixed—left side view.

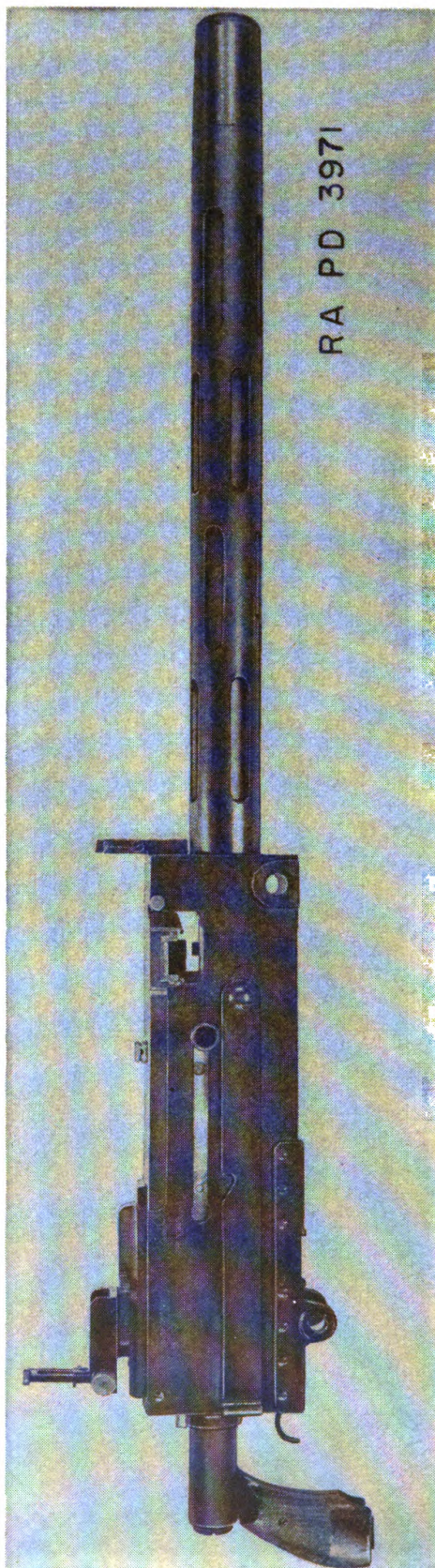


FIGURE 7.—Browning machine gun, caliber .30, M1919A4—flexible—right side view.

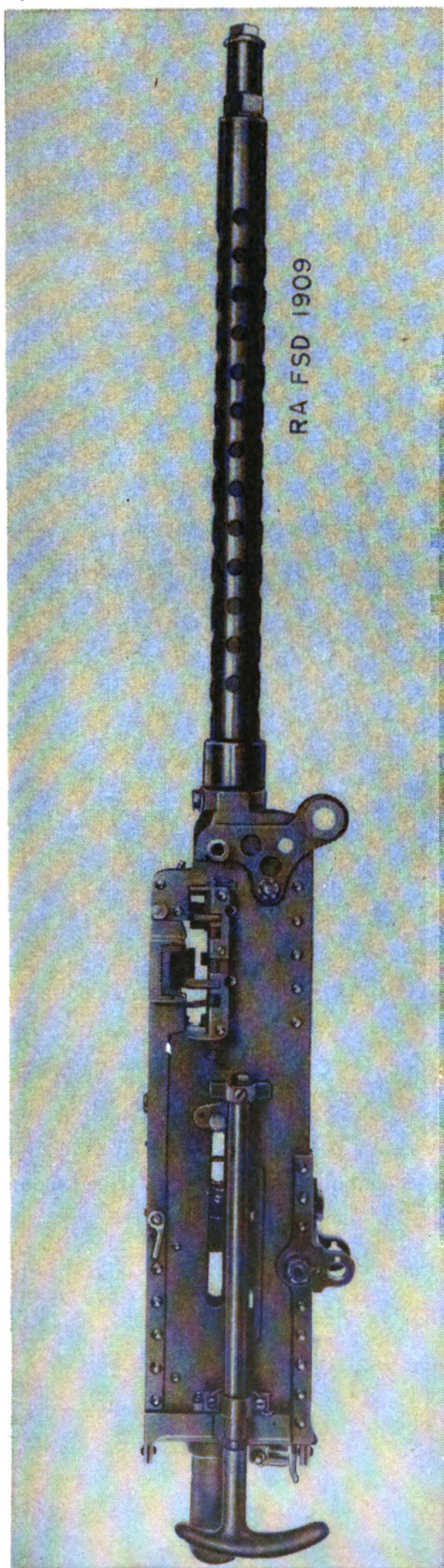


FIGURE 8.—Browning machine gun, caliber .30, M2, aircraft—fixed—right side view.

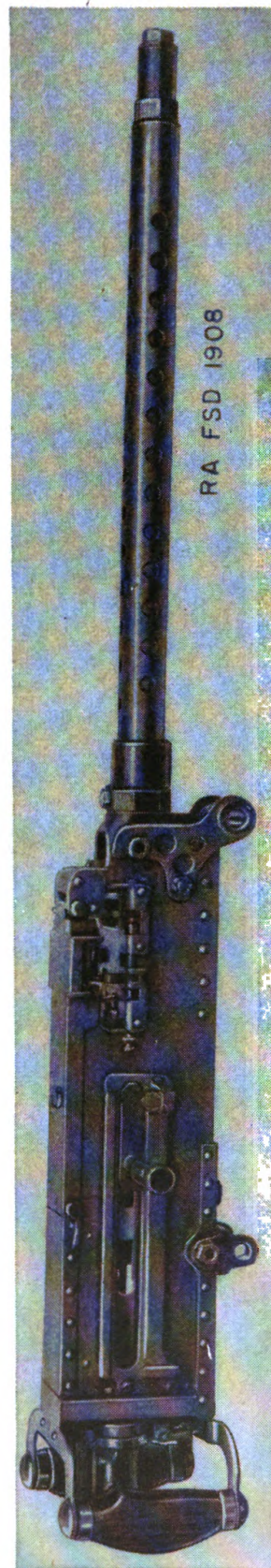


FIGURE 9.—Browning machine gun, caliber .30, M2, aircraft—flexible—right side view.

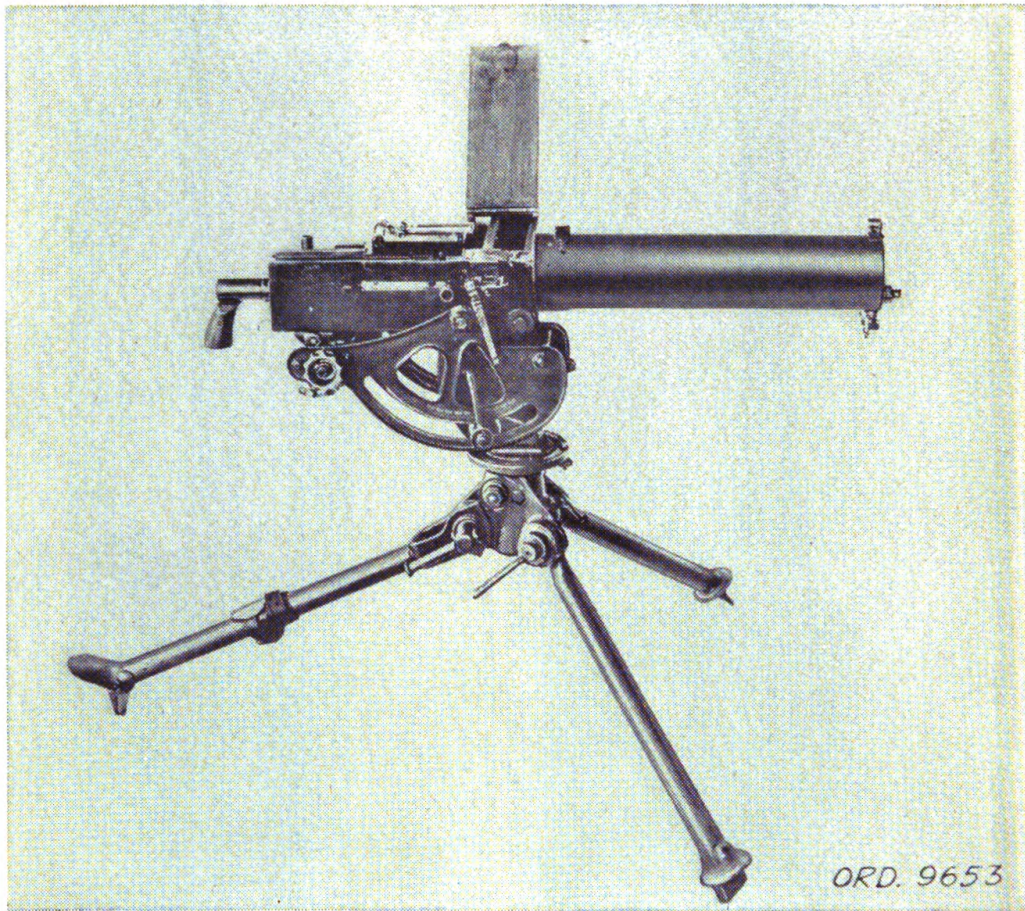


FIGURE 10.—U. S. machine gun, caliber .22, M1—mounted on machine-gun tripod mount, caliber .30, M1917A1.

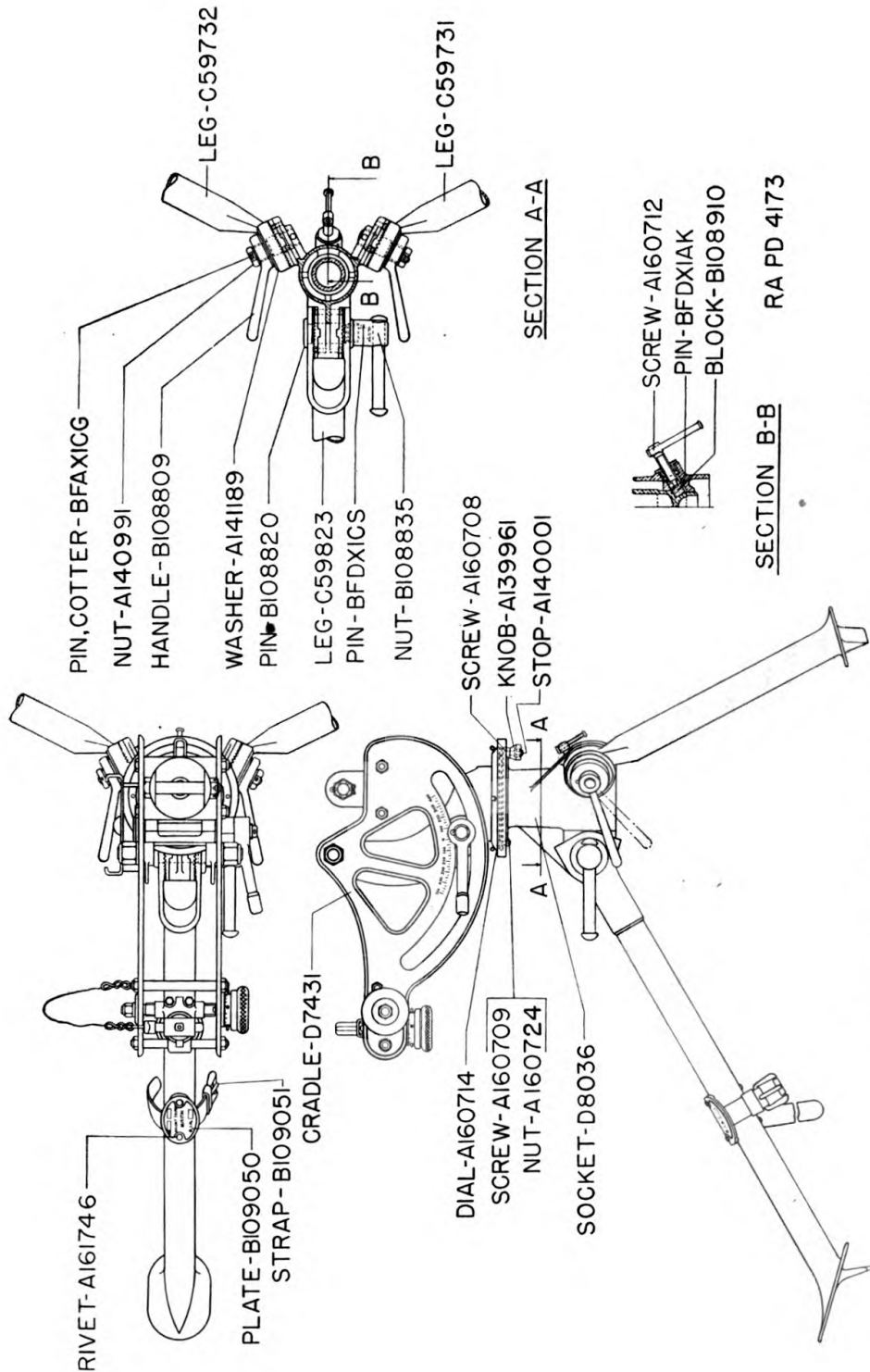
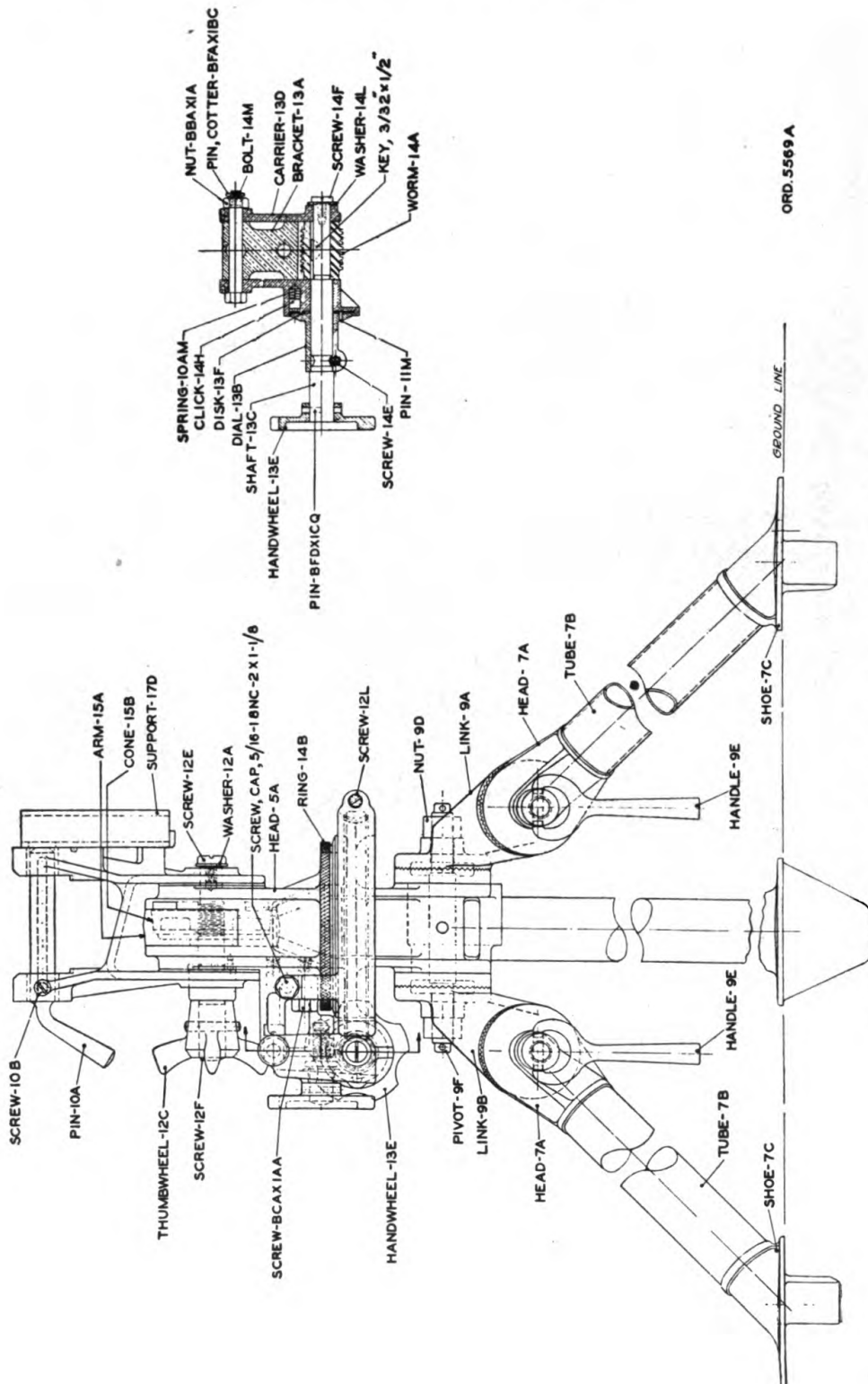
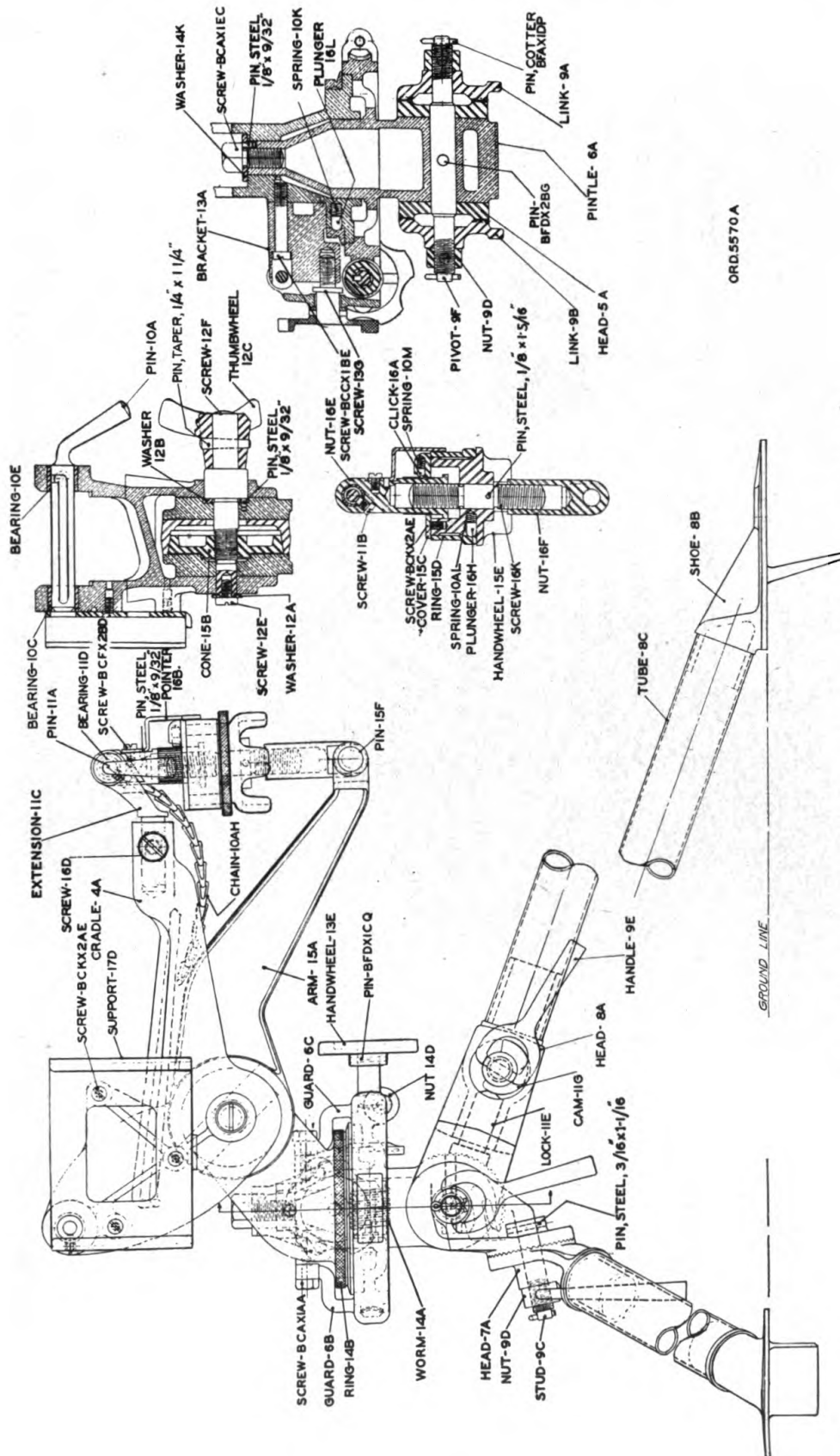


FIGURE 11.—Machine-gun tripod mount, caliber .30, M1917A1.



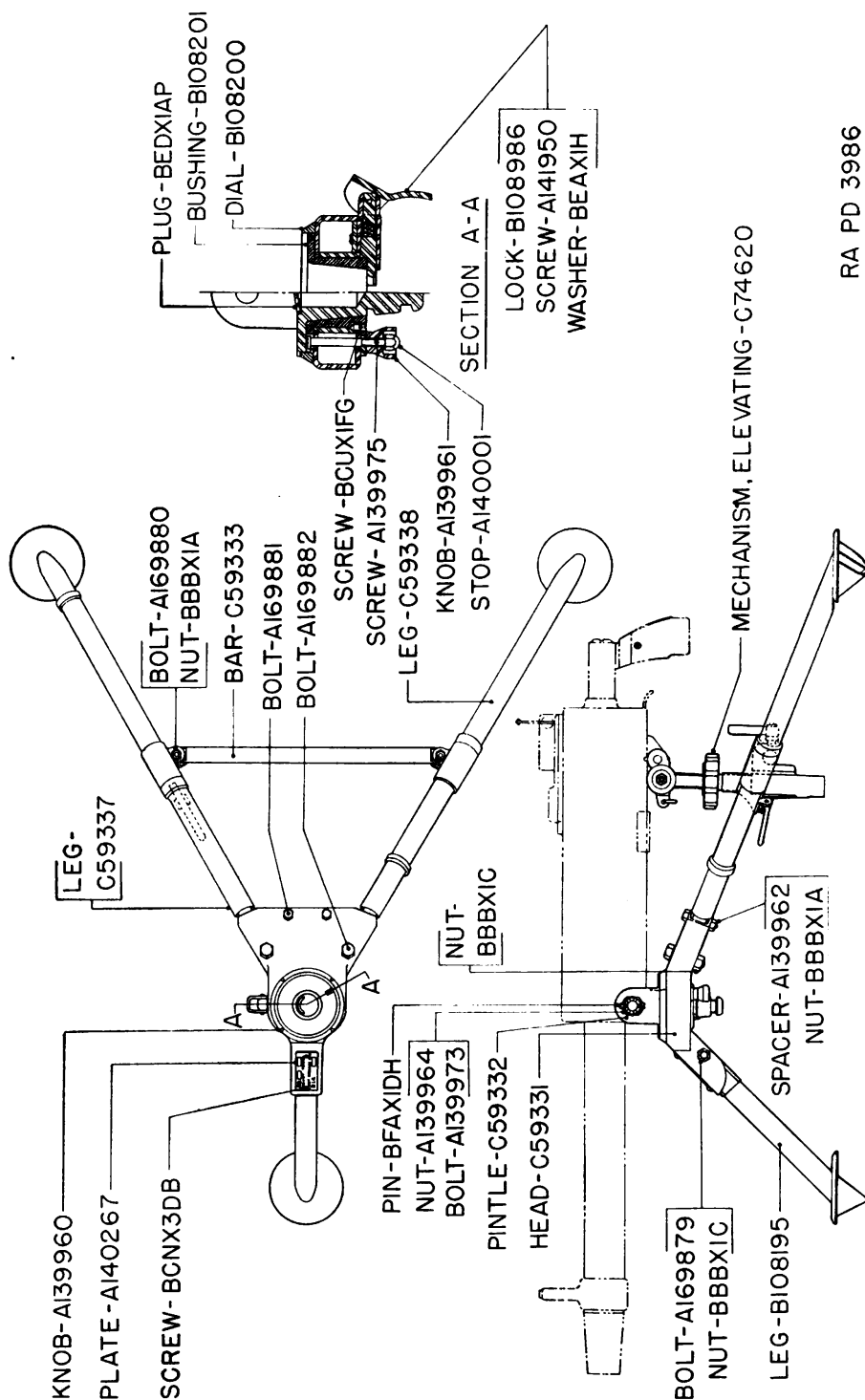
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FIGURE 12.—Machine-gun tripod M1918—sectional view—front.



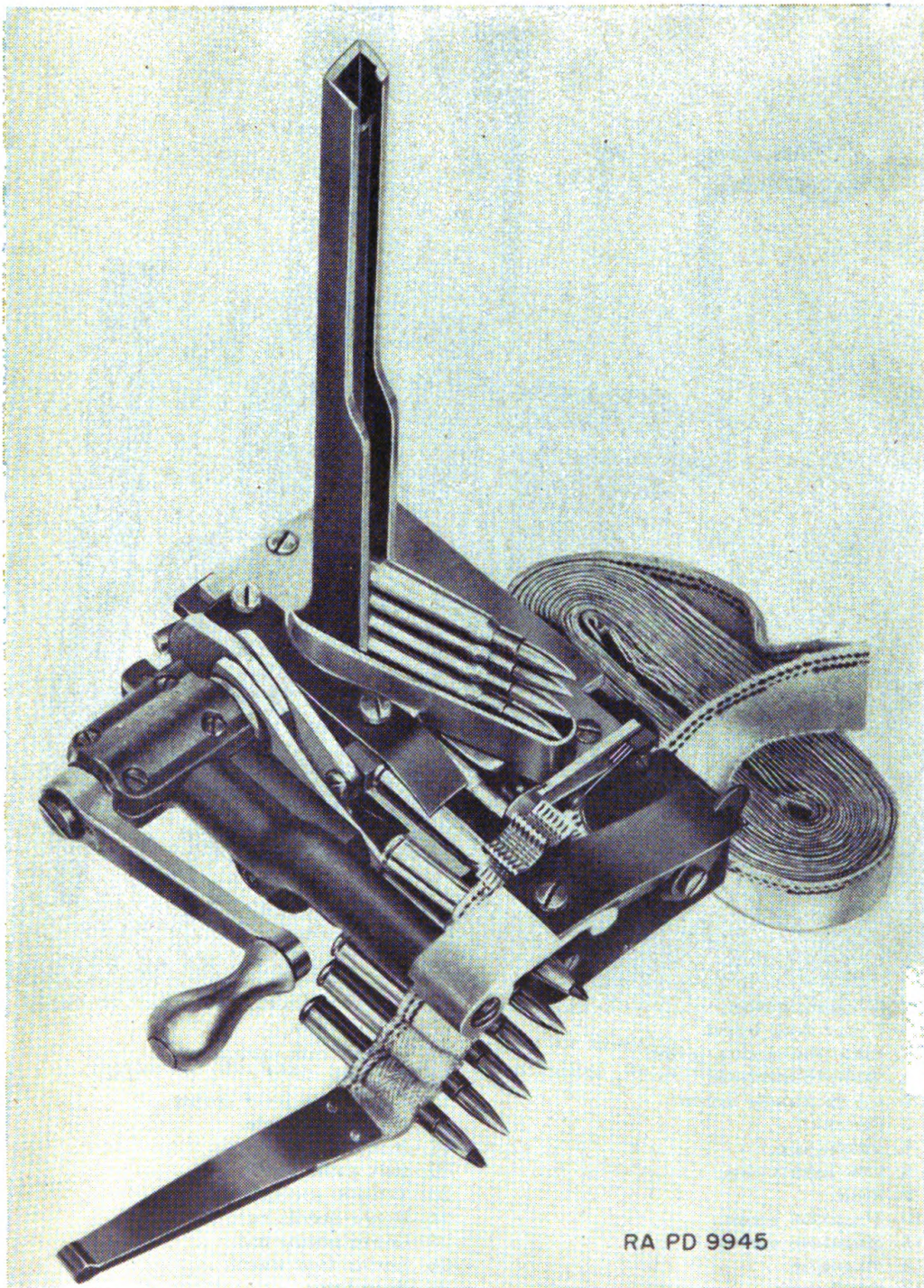
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FIGURE 13.—Machine-gun tripod M1918—sectional view—side.



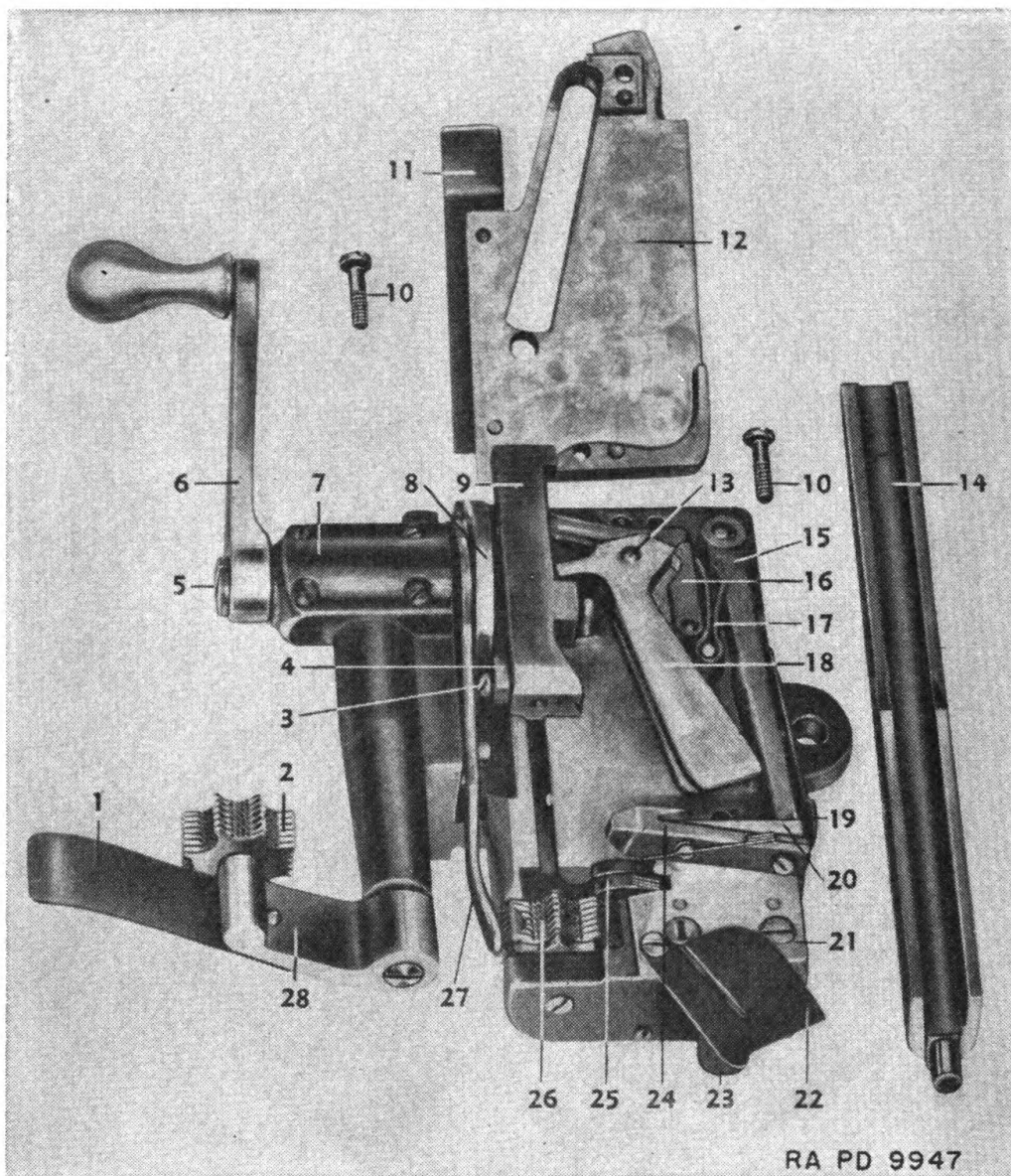
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Figure 14.—Machine-gun tripod mount, caliber .30, M2.



① Cartridges being loaded into belt.

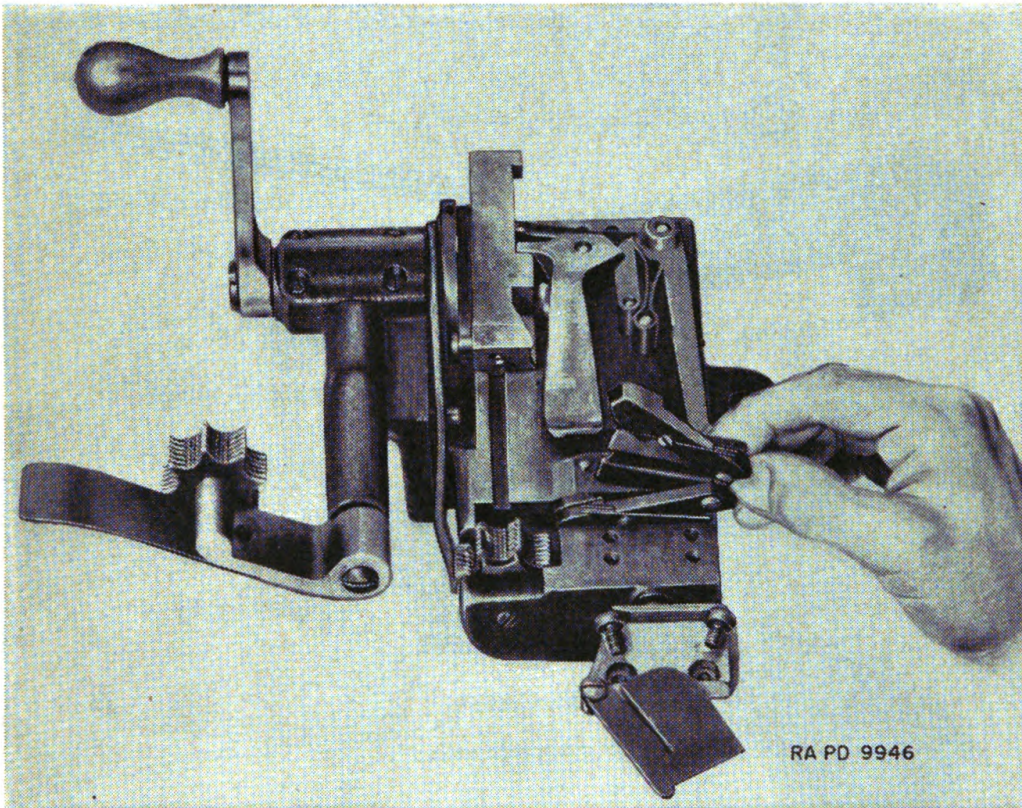
FIGURE 15.—Browning belt-filling machine, caliber .30, M1918.



- | | |
|----------------------------|------------------------------|
| 1. Tension spring. | 15. Needle bar lever. |
| 2. Upper feed wheel. | 16. Carrier cam. |
| 3. Slide connection screw. | 17. Carrier cam spring. |
| 4. Slide connection. | 18. Carrier. |
| 5. Crank handle screw. | 19. Needle bar lever spring. |
| 6. Crank. | 20. Needle bar slide. |
| 7. Frame cap. | 21. Belt guide. |
| 8. Crankshaft cam. | 22. Belt guide cover. |
| 9. Slide. | 23. Tension spring hook. |
| 10. Magazine screw. | 24. Upper needle bar. |
| 11. Magazine spring. | 25. Lower needle bar. |
| 12. Magazine. | 26. Lower feed wheel. |
| 13. Carrier pin. | 27. Feed lever. |
| 14. Cartridge guide. | 28. Upper feed wheel arm. |

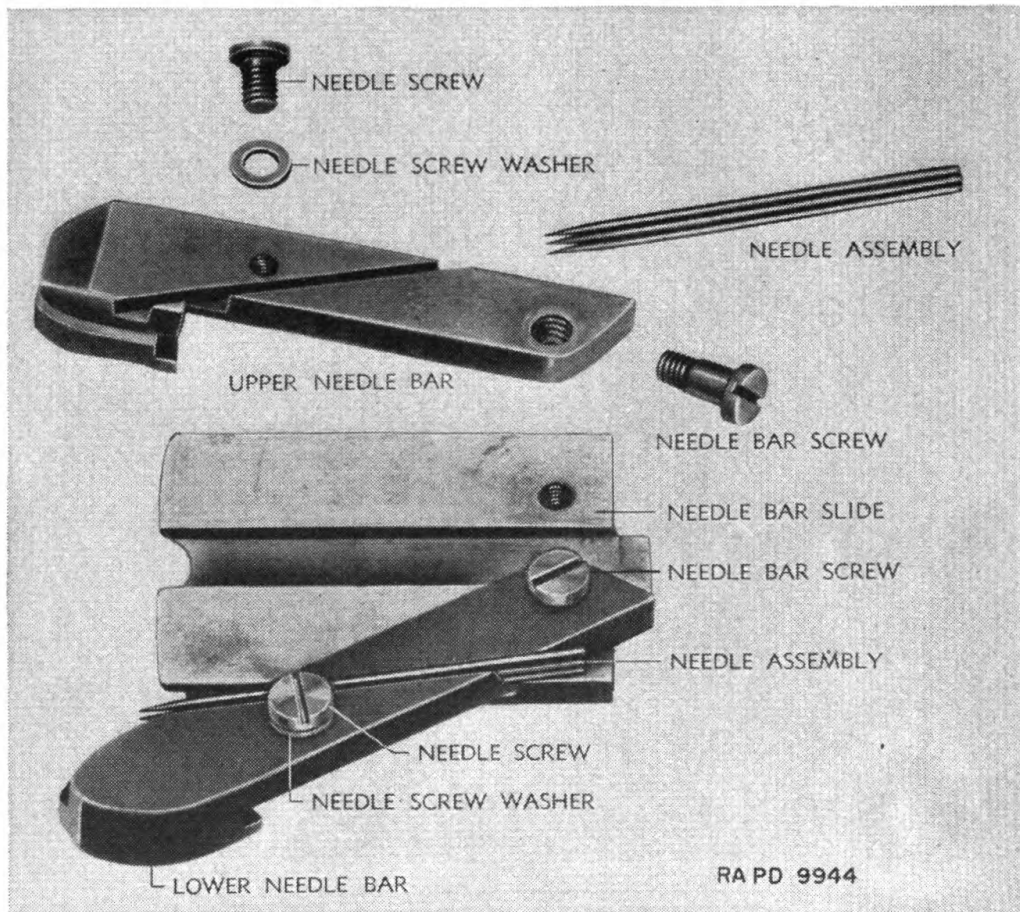
② Magazine and cartridge guide removed.

FIGURE 15.—Browning belt-filling machine, caliber .30, M1918—Continued.



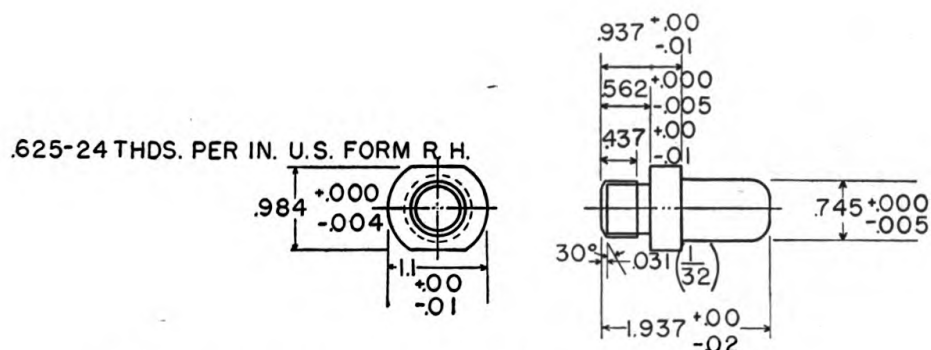
③ Removal of needle bar slide assembly.

FIGURE 15.—Browning belt-filling machine, caliber .30, M1918—Continued.

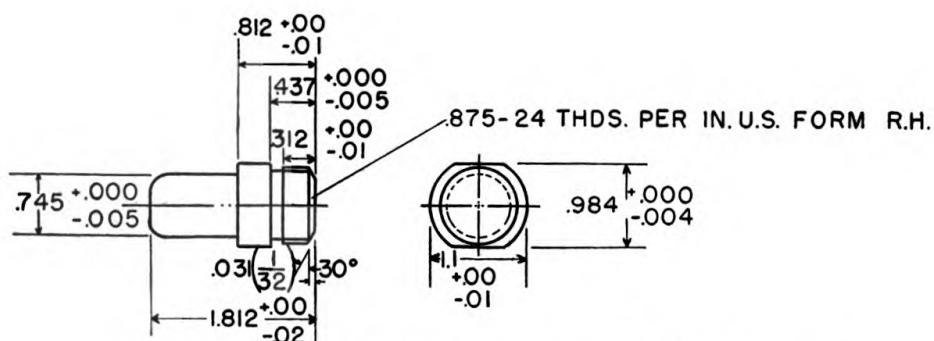


④ Disassembly of needle bar slide assembly.

FIGURE 15.—Browning belt-filling machine, caliber .30, M1918—Continued.

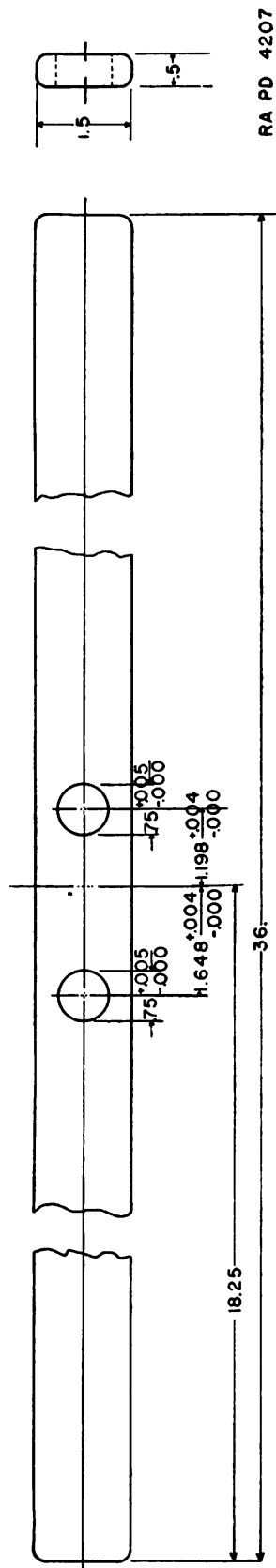


- ① Plug, steam tube wrench, one-steel ; remove all sharp corners.



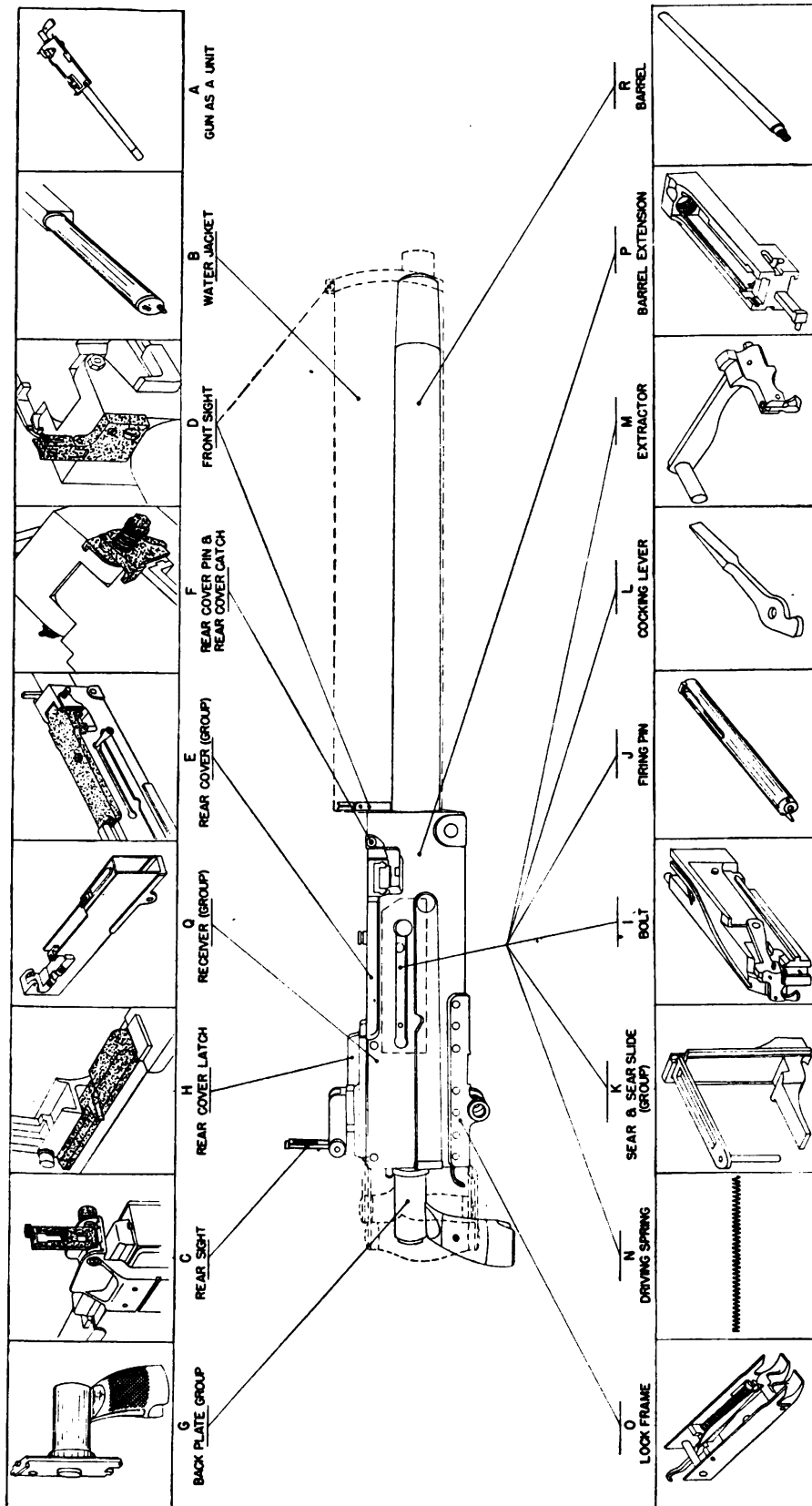
- ② Plug, muzzle gland wrench, one-steel ; remove all sharp corners.

FIGURE 16.—Water jacket disassembling wrench.



③ Handle, end cap wrench, one-steel ; remove all sharp corners (to be made from bar stock ; outside dimensions are approximate).

FIGURE 16.—Water jacket disassembling wrench—Continued.



RA PD 4244

FIGURE 17.—Inspection guide for caliber .30 Browning machine guns.

APPENDIX

LIST OF REFERENCES

1. Standard Nomenclature Lists.

- Gun, machine, caliber .30, Browning, M1917,
and M1917A1, and mounts----- SNL A-5.
- Gun, machine, caliber .30, Browning, M1919A2
and M1919A4—fixed and flexible and ground
mounts----- SNL A-6.
- Gun, machine, caliber .30, Browning aircraft,
M1919 (for fixed and flexible use)----- SNL A-12.
- Gun, machine, caliber .30, Browning aircraft,
M1918MI (for fixed and flexible use)----- SNL A-13.
- Gun, machine, caliber .30, Browning, M2, air-
craft—fixed and flexible----- SNL A-28.
- Tools, special repair, automatic guns, auto-
matic gun antiaircraft matériel, automatic
and semiautomatic cannon and mortars----- SNL A-35.
- Gun, machine, caliber .22, U. S., M1----- SNL A-40.
- Gun, machine, caliber .30, Browning, M2, heavy
barrel, fixed and flexible and ground mounts SNL A-41.
- Trainers, machine gun----- SNL A-48.

2. Field Manuals.

- Browning machine gun, caliber .30, HB,
M1919A4, ground----- FM 23-45.
- Browning machine gun, caliber .30, HB,
M1919A4 (mounted in combat vehicles)---- FM 23-50.
- Browning machine gun, caliber .30, M1917---- FM 23-55.

3. Technical Manuals.

- Cleaning, preserving, lubricating and welding
materials and similar items issued by the
Ordnance Department----- TM 9-850.
- Matériel inspection and repair----- TM 9-1100.

[A. G. 062.11 (9-30-41).]

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D(2); Bn9(2); C9(4).
(For explanation of symbols see FM 21-6.)

